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EXAMINER	
SINKANTARAKORN, PAWARIS	

ART UNIT	PAPER NUMBER
2416	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/749,902	MALTSEV ET AL.	
	Examiner	Art Unit	
	Pao Sinkantarakorn	2416	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _29 December 2003_.
2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-30_ is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) _1,3,4,6,8-11,14-17,22,23,25,28 and 29_ is/are rejected.
7)☒ Claim(s) _2,5,7,12,13,18-21,24,26,27 and 30_ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☒ The drawing(s) filed on _29 December 2003_ is/are: a)☒ accepted or b)☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a)☐ All b)☐ Some * c)☐ None of:
1.☐ Certified copies of the priority documents have been received.
2.☐ Certified copies of the priority documents have been received in Application No. _____.
3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 103

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1, 3-4, 14-17, 25, and 28-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Korobkov et al. (US 2003/023383) in view of Shah (USPN 6,173,164).

Regarding claim 1, Korobkov et al. disclose a receiver comprising:

a subchannel filter selection switch to provide a baseband signal to a selected one of a plurality of subchannel filters (see paragraphs 73-78, forwarding the baseband signal to each of processing branches corresponding to a specific sub-channel); and

a heterodyne frequency generator to provide one of a plurality of heterodyne frequencies to convert a radio-frequency signal received within a selected subchannel to the baseband signal (see paragraph 73, converting from Intermediate Frequency to baseband signal in IF downconverter),

wherein the subchannel filters are to accumulate signal information from an associated one of a plurality of subchannels during a filter-input sampling interval (see paragraphs 78-79, the portion of the spectrum corresponding to sub-channel n is extracted, shifted to 0 Hz baseband and filtered, where the extracting, shifting, and filtering steps are broadly interpreted as accumulating signal information).

Korobkov et al. fail to teach that the sub-channel filters are low-pass filters. However, Shah, from the same or similar fields of endeavor, discloses low-pass sub-channel filters (see column 3 lines 23-40).

Thus, it would have been obvious to the person of ordinary skill in the art at the time of the invention to replace the filters of Korobkov with the low-pass filters of Shah because one of ordinary skill in the art would have been able to carry out such a simple substitution, i.e. using low-pass filters rather than unspecified filters, and the results were reasonably predictable.

Regarding claim 3, Korobkov et al. disclose the receiver is a wideband channel receiver further comprising radio-frequency circuitry to receive orthogonal frequency division multiplexed signals in a wideband channel (see paragraph 72, OFDM receiver receives K sub-channels of data) comprising a plurality of subchannels,

wherein each subchannel filter corresponds to one of the plurality of subchannels (see paragraph 78, each K processing branch corresponds to a specific sub-channel),

wherein the subchannels have a subchannel bandwidth (see paragraphs 26-27).

Korobkov et al. does not expressly teach the subchannel low-pass filters have a filter bandwidth of approximately half the subchannel bandwidth. However, Shah, from the same or similar fields of endeavor, disclose the subchannel low-pass filters have a filter bandwidth of approximately half the subchannel bandwidth (see Figure 3 and column 4 lines 46-59, $f_{VCXO} \pm fc$, where fc is approximately half of f_{VCXO}).

Thus, it would have been obvious to implement the subchannel low-pass filters have a filter bandwidth of approximately half the subchannel bandwidth as taught by Shah into the receiver of Korobkov et al. and the results were reasonably predictable.

Regarding claim 4, Korobkov et al. disclose the receiver further comprises:

a whole-channel analog-to-digital converter (See Figure 7 A/D 86); and

a subchannel filter output selection switch responsive to a subchannel filter output selection signal to provide an accumulated signal output from the selected subchannel low-pass filter to the whole-channel analog-to-digital converter (see Figure 7 processing branches 92(1)-92(K) and paragraphs 73-78);

regarding claim 14, the subchannels comprise a plurality of symbol-modulated orthogonal subcarriers (see paragraphs 17 and 40), and wherein each orthogonal subcarrier of a corresponding subchannel has a null at substantially a center frequency of other subcarriers of the corresponding subchannel (see Table 2 and paragraph 26, Fc(n));

regarding claim 15, prior to reception by the receiver, the subcarriers are to be individually modulated in accordance with an individual subcarrier modulation assignment comprising one of no modulation, BPSK, QPSK, 8PSK, 16-QAM, 32-QAM, 64-QAM, 128-QAM, and 256-QAM (see paragraph 17, QPSK, 16-QAM, and 64-QAM).

Regarding claims 16 and 28, Korobkov et al. disclose a method comprising:

accumulating signal information from a selected one of a plurality of subchannels during a filter-input sampling interval in an associated subchannel filter (see paragraphs 78-79, the portion of the spectrum corresponding to sub-channel n is extracted, shifted

to 0 Hz baseband and filtered, where the extracting, shifting, and filtering steps are broadly interpreted as accumulating signal information);

repeating the accumulating for others of the subchannels during the filter-input sampling interval (see paragraphs 78-79, the extracting, shifting, and filtering steps are performed for each of the K processing branches; thus, repeating the accumulating); and

performing a fast Fourier transform on digital signals generated from the accumulated signal information from the plurality of subchannels to generate a received orthogonal frequency division multiplexed symbol Isee paragraph 78, an FFT receiver performs a fast Fourier transform (FFT) to recover the signal values modulated on each sub-carrier).

Korobkov et al. fail to teach that the sub-channel filters are low-pass filters. However, Shah, from the same or similar fields of endeavor, discloses low-pass sub-channel filters (see column 3 lines 23-40).

Thus, it would have been obvious to the person of ordinary skill in the art at the time of the invention to replace the filters of Korobkov with the low-pass filters of Shah because one of ordinary skill in the art would have been able to carry out such a simple substitution, i.e. using low-pass filters rather than filters, and the results were reasonably predictable.

Regarding claims 17 and 29, Korobkov et al. disclose the method further comprising:

providing a baseband signal to a selected one of a plurality of subchannel filters during the filter-input sampling interval (see paragraphs 73-78, forwarding the baseband signal to each of processing branches corresponding to a specific sub-channel);

providing, during the filter-input sampling interval, one of a plurality of heterodyne frequencies to convert a radio-frequency signal received within the selected subchannel to the baseband signal (see paragraph 73, converting from Intermediate Frequency to baseband signal in IF downconverter).

Regarding claim 25, Korobkov et al. disclose a system comprising:

a substantially omnidirectional antenna (see Figure 2, the antenna of the receiver 80 is substantially omnidirectional);

a subchannel filter selection switch to provide a baseband signal to a selected one of a plurality of subchannel filters (see paragraphs 73-78, forwarding the baseband signal to each of processing branches corresponding to a specific sub-channel); and

a heterodyne frequency generator to provide one of a plurality of heterodyne frequencies to convert a radio-frequency signal received within a selected subchannel to the baseband signal (see paragraph 73, converting from Intermediate Frequency to baseband signal in IF downconverter),

wherein the subchannel filters are to accumulate signal information from an associated one of a plurality of subchannels during a filter-input sampling interval (see paragraphs 78-79, the portion of the spectrum corresponding to sub-channel n is extracted, shifted to 0 Hz baseband and filtered, where the extracting, shifting, and filtering steps are broadly interpreted as accumulating signal information).

Korobkov et al. fail to teach that the sub-channel filters are low-pass filters. However, Shah, from the same or similar fields of endeavor, discloses low-pass sub-channel filters (see column 3 lines 23-40).

Thus, it would have been obvious to the person of ordinary skill in the art at the time of the invention to replace the filters of Korobkov with the low-pass filters of Shah because one of ordinary skill in the art would have been able to carry out such a simple substitution, i.e. using low-pass filters rather than unspecified filters, and the results were reasonably predictable.

6. Claims 6, 8-9, 10-11, and 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Korobkov et al. in view of Tu et al. (US 2005/0144650).

Regarding claims 6, Korobkov discloses all of the subject matter of the claimed invention except the receiver further comprising a plurality of subchannel analog-to-digital converters, the subchannel analog-to-digital converters to receive an accumulated signal output from a corresponding one of the subchannel low-pass filters. However, Tu et al., from the same or similar fields of endeavor disclose a plurality of subchannel analog-to-digital converters (see Figure 4A A/D 442-1-2), the subchannel analog-to-digital converters to receive an accumulated signal output from a corresponding one of the subchannel low-pass filters (see Figure 4A, the A/D converters receive signals from the Low-Pass Filters 438).

Thus, it would have been obvious to the person of ordinary skill in the art to implement a plurality of subchannel analog-to-digital converters, the subchannel analog-

to-digital converters to receive an accumulated signal output from a corresponding one of the subchannel low-pass filters into the receiver of Korobkov in order to allow analog-to-digital conversion (see paragraph 56).

Regarding claims 8, Korobkov et al. disclose the receiver further comprising an attenuator in a radio-frequency signal path responsive to the subchannel selection signal to attenuate the radio-frequency signal and provide a normalized signal level for the selected subchannel filter and a corresponding one of the subchannel analog-to-digital converters (see paragraph 73, the downconverter 84 downconverts the received signal to a suitable Intermediate Frequency form and provide it to the selected subchannel filter and the A/D converter).

Regarding claims 9 and 22, Korobkov discloses all of the subject matter of the claimed invention except the heterodyne frequency generator comprises: a fixed-frequency voltage-controlled oscillator to generate a reference frequency; a digital synthesizer to generate a selected one of a plurality of stepped frequencies in response to a subchannel selection signal; and a frequency combiner to combine the reference frequency and the selected one of the stepped frequencies to generate one of the plurality of heterodyne frequencies. However, Tu et al., from the same or similar fields of endeavor disclose the heterodyne frequency generator (see Figure 4A Frequency Synthesizer) comprises: a fixed-frequency voltage-controlled oscillator to generate a reference frequency (see paragraph 41, crystal oscillator XO); a digital synthesizer to generate a selected one of a plurality of stepped frequencies in response to a subchannel selection signal (see paragraph 41, a phase locked loop synthesizer); and a

frequency combiner to combine the reference frequency and the selected one of the stepped frequencies to generate one of the plurality of heterodyne frequencies (see paragraph 41, the output local oscillator frequency is phase locked to the input reference frequency and its frequency is scaled by a factor M/N to the input reference signal frequency).

Thus, it would have been obvious to the person of ordinary skill in the art at the time of the invention to implement the heterodyne frequency generator comprises: a fixed-frequency voltage-controlled oscillator to generate a reference frequency; a digital synthesizer to generate a selected one of a plurality of stepped frequencies in response to a subchannel selection signal; and a frequency combiner to combine the reference frequency and the selected one of the stepped frequencies to generate one of the plurality of heterodyne frequencies as taught by Tu et al. into the receiver of Korobkov in order to generate a sinusoidal waveform that does not exceed +8 dBm, with a frequency ranging from 560 MHz to 1760 MHz (see paragraphs 41 and 44).

Regarding claims 10, Korobkov discloses all of the subject matter of the claimed invention except the heterodyne frequency generator comprises: a plurality of fixed-frequency voltage-controlled oscillators, each fixed-frequency voltage-controlled oscillator to generate a corresponding one of the plurality of heterodyne frequencies; and a subchannel heterodyne switch to select a heterodyne frequency from one of the fixed-frequency voltage-controlled oscillators in response to a subchannel selection signal. However, Tu et al., from the same or similar fields of endeavor disclose the heterodyne frequency generator (see Figure 4A Frequency Synthesizer) comprises: a

plurality of fixed-frequency voltage-controlled oscillators, each fixed-frequency voltage-controlled oscillator to generate a corresponding one of the plurality of heterodyne frequencies (see paragraph 41, a phase locked loop synthesizer for each frequency synthesizer); and a subchannel heterodyne switch to select a heterodyne frequency from one of the fixed-frequency voltage-controlled oscillators in response to a subchannel selection signal (see paragraphs 41 and 44).

Thus, it would have been obvious to the person of ordinary skill in the art at the time of the invention to implement the heterodyne frequency generator comprises: a plurality of fixed-frequency voltage-controlled oscillators, each fixed-frequency voltage-controlled oscillator to generate a corresponding one of the plurality of heterodyne frequencies; and a subchannel heterodyne switch to select a heterodyne frequency from one of the fixed-frequency voltage-controlled oscillators in response to a subchannel selection signal as taught by Tu et al. into the receiver of Korobkov in order to generate a sinusoidal waveform that does not exceed +8 dBm, with a frequency ranging from 560 MHz to 1760 MHz (see paragraphs 41 and 44).

Regarding claims 11 and 23, Korobkov discloses all of the subject matter of the claimed invention except the receiver comprising: a plurality of subchannel analog-to-digital converters, the subchannel analog-to-digital converters to receive an accumulated signal output from a corresponding one of the subchannel low-pass filters; and a plurality of subchannel amplifiers to amplify the accumulated signal outputs based on a gain control signal, the gain control signal being generated for each subchannel. However, Tu et al., from the same or similar fields of endeavor disclose the receiver

comprising: a plurality of subchannel analog-to-digital converters, the subchannel analog-to-digital converters to receive an accumulated signal output from a corresponding one of the subchannel low-pass filters (see Figure 4A A/D 442-1-2 receives an accumulated signal from LPF 438); and a plurality of subchannel amplifiers to amplify the accumulated signal outputs based on a gain control signal, the gain control signal being generated for each subchannel (see Figure 4A AMP 436-1-2, AGC1,1 and paragraphs 53 and 55).

Thus, it would have been obvious to the person of ordinary skill in the art at the time of the invention to implement the receiver comprising: a plurality of subchannel analog-to-digital converters, the subchannel analog-to-digital converters to receive an accumulated signal output from a corresponding one of the subchannel low-pass filters; and a plurality of subchannel amplifiers to amplify the accumulated signal outputs based on a gain control signal, the gain control signal being generated for each subchannel as taught by Tu et al. into the receiver of Korobkov in order to allow analog-to-digital conversion and to allow automatically controlling the gain of the amplification means (see paragraphs 53 and 55).

Allowable Subject Matter

7. Claims 2, 5, 7, 12-13, 18-21, 24, 26-27, and 30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

8. **Examiner's Note**: Examiner has cited particular columns and line numbers in the references applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner.

In the case of amending the claimed invention, Applicant is respectfully requested to indicate the portion(s) of the specification which dictate(s) the structure relied on for proper interpretation and also to verify and ascertain the metes and bounds of the claimed invention.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Pao Sinkantarakorn whose telephone number is (571)270-1424. The examiner can normally be reached on Monday-Thursday 9:00am-3:00pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ricky Ngo can be reached on 571-272-3139. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/P. S./
Examiner, Art Unit 2416

/Ricky Ngo/
Supervisory Patent Examiner, Art Unit 2416